REMARKS

Claims 18-26 are pending. Reconsideration is respectfully requested.

Claims 18, 22, 24 and 25 stand rejected under 35 U.S.C. 102(b) as being anticipated by Imamura. This rejection is respectfully traversed.

As noted in the previous response, Imamura describes $Nb/AlO_x/Nb$ Josephson junctions shown in Figs. 1a-1b and 2a-2d with junction contacts that are 1.0 μm square (Fig. 4a) and 0.7 μm square (Fig. 4b) with associated contact holes of 3.0 μm square (Fig. 4a) and 3.0 μm circle (Fig. 4b). See bottom of col. 2, p. 1587. It is important to further note that Imamura also describes in the cited sections the challenges and difficulties associated with achieving success with such sub micrometer junctions. Imamura uses a process involving self-aligned contact, and the use of Nb films as the junction electrodes (page 1586, col 1, first paragraph, line 19.)

As a way of narrowing the issues and highlighting the various ways the claimed invention distinguishes over the description in Imamura, the Examiner's attention is directed to page 1587, col 2, paragraph 1 (first full paragraph), line 3 and 4. Although, Imamura initially and generally describes an anodization process as resulting in junction sizes smaller than 1μm, the process does not amount to the claimed invention. More importantly, Imamura clearly states that the resulting junctions were flawed, e.g. the junctions possessed leaky voltage-current characteristics. The teachings related to anodizing processes in Imamura would not enable one of skill in the art to make and use the invention, and thus these teachings are inadequate to support or maintain a proper rejection under 102(b).

To address the failure of the conventional anodizing process described in Imamura in achieving sub-micrometer junctions, an additional step of depositing Nb by sputtering at 2.3 Pa is required (see, e.g. page 1587, col 2, paragraph 1 (first full paragraph), line 13.) Imamura, by

requiring the Nb sputtering to achieve the desired junction size and stress free characteristic, inherently fails to describe, for example, the anodized ring disposed around a perimeter of the counter electrode layer and a perimeter of the tunnel barrier layer for preventing a short-circuit between an outside contact and the base electrode layer. Thus it is clear that Imamura fails to disclose the claimed invention.

While previous arguments have focused on the size of the junction and whether the feature of the claim in reciting a diameter of approximately 1.00 μm or less for the junction contact reads on descriptions in Imamura, applicant emphasizes that other features, such as the counter electrode portion and anodization ring and tunnel junction region are not disclosed or even suggested in Imamura. The Examiner has noted that Fig 1(b) of Imamura is considered as showing the claimed anodizing ring. The applicant respectfully disagrees with this characterization and respectfully requests that the Examiner point out as nearly as practicable, as required by the rules as outlined for example in MPEP 707, which feature of Imamura is alleged to amount to the claimed anodizing ring, or withdraw the rejection.

Imamura describes that Fig 1(b) shows a trilayer junction made by conventional anodizing which junction is then etched to achieve further structure. Imamura at best shows a base electrode, but fails to show the claimed counter electrode (24) as clearly illustrated, for example, in Fig. 6 of the present application. Nowhere does Imamura describe an anodizing ring as claimed and described in paragraph [0031] of applicant's specification. Instead Imamura, as best, describes sputtering Nb to achieve a junction electrode in a manner quite different from the claimed invention.

Applicant strongly contends that in view of Imamura's admission that anodizing processing fails to produce an operative junction of less than 1μm, and in view of Imamura's corresponding departure from any semblance of the teachings of applicant's specification, e.g. by

requiring additional Nb sputtering processing at higher than usual pressures to achieve a junction electrode, Imamura *teaches away from the claimed invention*. It is important to note that even though Imamura describes conventional anodizing to form the basic trilayer structure, Imamura, as noted above, still fails to disclose an anodization ring as claimed since the tunnel barrier is never exposed or anodized as in the claimed invention. See, e.g., paragraph [0029] of applicant's specification.

Despite the Examiner's contentions to the contrary, Imamura further fails to disclose the claimed tunnel junction region is defined by the counter electrode layer, the tunnel barrier layer and the base electrode layer. The claimed tunnel junction region includes a junction contact defined by a top surface of the counter electrode, the junction contact having a diameter of approximately 1.00 μm or less. The claimed tunnel junction region (26) results from being unexposed to anodization applied to the tunnel barrier layer (17) as described for example, in paragraph [0029] of applicant's specification and thus is not simply surrounding a portion of the tunnel barrier layer (17). The tunnel barrier in Imamura is never exposed to anodizing and thus Imamura necessarily fails to disclose the claimed tunnel junction region, especially in the manner claimed. Further, the language of the claims does not require that the anodization ring surround an entire tunnel barrier layer. Rather, it can clearly be understood that some perimeter of the tunnel barrier layer is encircled by the claimed anodization ring.

In considering the above argument, it can also be clearly appreciated that while applicant does not dispute the dictionary definition of the term "diameter", since the claims are directed to an anodization "ring" around a perimeter of the counter electrode layer and a perimeter of the tunnel barrier layer, one of ordinary skill in the art would consider the claimed ring as defining a circular or approximately circular structure. Thus, the claimed diameter can be distinguished

from structures, such as those described in Imamura, failing to contain, for example, the claimed anodization "ring."

Accordingly, as noted in the previous response, a *prima facie* case of anticipation has not been established and cannot be sustained in that the applied reference fails to disclose the claimed invention, particularly in the manner claimed. Imamura, further, teaches away from the claimed invention. It is respectfully requested therefore that the rejection of claim 18 be reconsidered and withdrawn.

Claims 22, 24 and 25 by depending from claim 18 are allowable for at least the reasons set forth herein above. The rejection of claims 22, 24 and 25 should therefore be withdrawn.

It should be noted that dependent claims 22, 24 and 25 are independently allowable in that they can be further distinguished over Imamura. Specifically, Imamura fails to teach, for example, that a tunnel barrier layer, such as the Al-AlO_x layer disclosed therein, is disposed solely within the anodization ring (anodized Nb) especially given that, for at least the reasons set forth hereinabove, the anodization ring is not disclosed or even suggested. Further consideration of these defining features is respectfully requested, as the Examiner has failed to establish a *prima facie* case of anticipation with regard to these features.

Claims 18 stands rejected under 35 U.S.C. 102(b) as being anticipated by Lee. This rejection is respectfully traversed.

Lee describes a technique for fabricating a Josephson trilayer junction sandwich of Nb/AlO_x/Nb in which an anodized layer of Nb surrounds an upper layer of Nb. However, the junction sandwich described in Lee differs from the superconductor integrated circuit recited in claim 18 because, although the junction sandwich is formed from Nb/AlO_x/Nb, the anodized Nb layer shown in Fig. 1d surrounds the upper Nb layer but not the Al-AlO_x barrier layer. As noted above in the discussion of Imamura, this differs from the anodization ring of the present

invention, which as shown in FIG. 6 is disposed around a perimeter of both the counterelectrode layer and the tunnel barrier layer for preventing a short circuit between an outside contact and the base electrode layer. It should further be noted that in the present invention the unexposed portion (26) in the counter electrode portion (24) can be distinguished from Nb electrode formation in that the barrier layer is exposed to anodization.

Accordingly, applicant submits that Lee fails to disclose features of the claimed invention, such as the claimed counter electrode layer disposed above a tunnel barrier layer and an anodization ring disposed around a perimeter of the counter electrode layer and a perimeter of the tunnel barrier layer for preventing a short-circuit between an outside contact and the base electrode layer. It is important to note that Lee further fails to disclose the claimed tunnel junction region defined by the counter electrode layer, the tunnel barrier layer and the base electrode layer, the tunnel junction region including a junction contact defined by a top surface of the counter electrode, the junction contact having a diameter of approximately 1.00 μm or less. While many of the Examiner's arguments focus simply on junction size, the claimed invention possesses additional distinguishing features which cannot simply be ignored.

It is well established that the Patent Office bears the duty to establish a *prima facie* case under 35 U.S.C. 102(b) or any of the patent laws by supplying evidence that the statutory requirements for patentability are unmet. To properly establish anticipation, the applied reference must teach every element of the claim (MPEP 2131). It is further well established that the teaching or disclosure must be enabling. In the present rejection, no evidence has been provided to support the assertion that given the descriptions in Lee, one of ordinary skill in the art would be able to make and use the claimed integrated circuit including specific features such as the anodization ring as recited in claim 18. While Fig. 5 describes that characteristics of "circular" Josephson junctions are shown, the details of such junctions are not described and

cannot be said to amount to an anticipatory teaching since one of ordinary skill in the art would be unable to make the claimed invention including the anodized ring as claimed based only on a single use of the word circular in a document otherwise devoid of relevant or sufficiently detailed teachings of the claimed structure.

Accordingly a *prima facie* case of anticipation has not been properly established in that the applied reference fails to disclose all the features in the manner claimed as required. It is respectfully requested that the rejection of claim 18 be reconsidered and withdrawn.

Claims 18, 22, 24 and 25 have been rejected under 35 U.S.C. 103(a) as being obvious in view of Imamura. This rejection is respectfully traversed.

Imamura is deficient in its teachings for the above noted reasons. Specifically, the Josephson junctions described in Imamura differ from the superconductor integrated circuit recited in claim 18 because, although the junctions are $Nb/AlO_x/Nb$ junctions, the anodized Nb_2O_5 layer shown in Fig. 2d is disposed around the upper Nb layer but not around the $Al\text{-}AlO_x$ layer. Such a configuration as described in Imamura fails to teach or suggest the claimed anodization ring and differs from the claimed anodization ring, which as shown in FIG. 6 is disposed around a perimeter of both the counterelectrode layer and the tunnel barrier layer for preventing a short circuit between an outside contact and the base electrode layer.

Accordingly, a *prima facie* case of obviousness has not been established in that Imamura fails to teach or suggest each and every claimed feature of the claimed invention. Still further, for the reasons set forth herein above, e.g. in view of Imamura's admission that the described anodizing processing fails to produce an operative junction of less than 1μm, and in view of Imamura's requiring additional Nb sputtering processing at higher than usual pressures to achieve a junction electrode, Imamura *teaches away from the claimed invention.*

Accordingly, the rejection of claim 18 should be reconsidered and withdrawn. Claims 22, 24 and 25, by virtue of depending from claim 18, are allowable for at least the reasons set forth hereinabove with regard to claim 18.

Claim 19 stands rejected under 35 U.S.C. 103(a) as being allegedly obvious in view of Imamura and Applicant's prior art admissions (APA).

Claim 19 by virtue of depending from claim 18, is allowable for at least the above discussed reasons. The rejection of claim 19 should be reconsidered and withdrawn.

Claims 20 and 21 stand rejected under 35 U.S.C. 103(a) as being allegedly obvious in view of the combination of Imamura and Kerber.

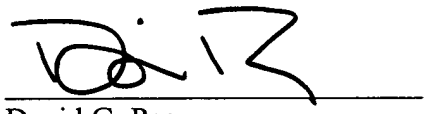
Claims 20 and 21 by virtue of depending from claim 18 are allowable for at least the reasons discussed hereinabove. The rejection of claims 20 and 21 should therefore be reconsidered and withdrawn.

The indication of allowable subject matter is noted with great appreciation. Applicant reserves the opportunity to re-write claims 23 and 26 in independent for pending consideration of applicants remarks provided herein.

In view of the foregoing, the applicant respectfully submits that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the examiner is invited to contact the undersigned by telephone.

Please charge any unforeseen fees that may be due to Deposit Account No. 50-1147.

Respectfully submitted,



David G. Posz
Reg. No. 37,701

Posz Law Group, PLC
11250 Roger Bacon Drive, Suite 10
Reston, VA 20190
Phone 703-707-9110
Fax 703-707-9112
Customer No. 23400